REMARKS

Reconsideration and allowance of the subject application are respectfully requested.

Claims 31-41 are pending.

Section 112, First Paragraph Rejection

Claims 31-41 stand rejected under 35 U.S.C. 112, first paragraph as failing to comply with the enablement requirement. Applicants respectfully traverse.

Previous Discussions

In this rejection, the Examiner raises many of the issues raised in the Office Action dated November 6, 2002 in the parent application. During the prosecution of the parent application, an Examiner Interview was conducted on April 10, 2003 to discuss these issues. During the Interview, applicants representative spent over two hours addressing the enablement issues raised by the Examiner. Specifically, it appeared that the Examiner lacked a background in computer software as well as generally accepted techniques for disclosing methods implemented in computer software. Applicants representative endeavored to provide the Examiner with this background information, and based on that discussion, was under the impression that the Section 112, first paragraph issues had been resolved.

However, the Examiner now brings up many of these same issues, with the same faulty foundation as if the Examiner has forgotten that lengthy discussion over a year ago. Accordingly, applicants will again attempt to explain the disclosure to the Examiner, but suggest that the Examiner may want to consider transferring this application to an art unit better suited to examining computer software related inventions. For example, Art Unit 2123 handled related Application No. 09/475,309 – now issued Patent No. 6,748,348, having very similar figures and disclosure to the subject application. The Examiner may want to consider transferring this application to that Art Unit.

In the event the Examiner continues with this case, below applicants have re-explained aspects of the disclosure.

Claim 31 Issues Raised

The Examiner Asserts That an Apparatus Supporting the Claimed Method Has Not Been Disclosed in Detail.

With respect to claim 31, the Examiner contends applicants rely on Figure 6B for support of claim 31 and that Figure 6B illustrates black boxes with no description of the internals thereof. The Examiner further goes on to cite In re Ghiron et al., 169 USPQ 723,727. The issue before the Court in the portion cited by the Examiner was whether a block

diagram provides sufficient disclosure of an apparatus for performing the claimed method such as to enable one skilled in the art to make and use the invention. Here, the court held that functional-type block diagrams are preferable disclosure if they serve in conjunction with the rest of the specification to enable a person skilled in the art to select a prior art apparatus that will produce results required to practice the claimed process with only a reasonable degree or routine experimentation.

From the assertions set forth by the Examiner, it appears that the Examiner incorrectly views Figure 6B as a function block diagram of an apparatus. Figure 6B is not a functional block diagram. Figure 6B is a flow chart. Functional block diagrams represent the structure of an apparatus by functional blocks. By contrast, a flow chart represents the steps performed by a computer, processor, etc.

As discussed during the Interview, Figure 1A illustrates the apparatus or system implementing software that results in the system performing the steps shown in Figure 6B. As such there are no "internals" to be shown for the blocks of Figure 6B. Further, Figure 1A does not illustrate the system as a functional block diagram. Instead, specific devices (as opposed to functions) are illustrated and described.

The application's recitation of the invention by showing and describing the system for implementing the claimed process such as in Figure 1A and the detailed description of the process steps using a flow chart as in Figure 6B is a common form of disclosing software related

inventions in patent applications. That the Examiner apparently misconstrued or misunderstood the disclosure evidences that perhaps the subject application should be reclassified in an art unit better suited to handling software related inventions, such as Art Unit 2123.

In any event, applicants have shown that a concrete system for implementing the claimed invention has been described and illustrated.

The Examiner Asserts That Claim 31 Does Not Disclose a Target or Standard to be Achieved

Applicants do not understand what this assertion has to do with whether the disclosure enables claim 31. Claim 31 recites "performing an optimization process ... to generate one or more optimized independent control variable values." As will be explained in detail below with respect to some of the other assertions made by the Examiner, this limitation is enabled by the disclosure.

If the Examiner believes that claim 31 is unclear for some reason, then a rejection under Section 112, second paragraph, not the first paragraph is more appropriate. Assuming the Examiner wishes to make this objection under Section 112, second paragraph, then applicants respectfully submit that claim 31 is clear on this issue. Claim 31 indicates that the optimization process generates one or more optimized

independent control variable values. Clearly, one or more optimized

independent control variable values is the target recited in claim 31.

The Examiner Asserts that the Disclosure Does Not Support Performing an

Optimization Process Based <u>Alone</u> on the Set Point Data

Applicants are confused by this grounds of rejection as well. No

where does claim 31 recite that the optimization process is performed

based on the state point data <u>alone</u>. The Examiner appears to be reading

limitations into the claims that do not exist.

The Examiner Asserts that the Description is Inadequate or Non-Enabling

for a) the Number of Independent and Dependent Variables, b) Which of

the Variables are Considered in the Analysis, c) What Weights are

Assigned to the Variables, and d) How are the Variables Considered in

the Analysis

The issues raised in this grounds of rejection appear to be the crux

of the Examiner's problem with this case. Namely, the Examiner appears

to believe that the subject application does not enable an optimization

process. However, applicants submit that 1) the specification itself does

not need to enable an optimization process in full and 2) that a full optimization process is enabled.

With respect to point 1), applicants submit that processes for optimizing one or more independent control variable values for nuclear reactor operation are known in the art. These known optimization processes dictate the inputs for the optimization process, how the inputs and other variables are handled, etc. During the Interview, applicants representative explained this and also indicated that applicants have provided the Examiner with the disclosure of a prior art optimization process in the Information Disclosure Statement filed on February 21, 2003. – see the Moore et al. article entitled "FORMOSA-B: A BOILING WATER REACTOR IN-CORE FUEL MANAGEMENT OPTIMIZATION PACKAGE," which discloses a full three-dimensional BWR (boiling water reactor) simulator with optimization by simulated annealing.

What is not known in the prior art, however, is basing the performance of the known optimization process, at least in part, on received state-point data as recited in claim 31.

With respect to point 2), Figure 5 and the related disclosure discuss a number of the optimization inputs associated with an example optimization process discussed in detail with respect to Figure 6B. While the list is not comprehensive for the optimization of all possible control variable values, the list does provide one skilled in the art with sufficient information on the optimization inputs such that one skilled in the art

would be able develop a more comprehensive list without undue experimentation. After all, optimization processes are already well-known and thus so are comprehensive lists of optimization inputs.

Figure 4 and its related disclosure discuss the modification of some of the optimization inputs based on received state-point data, and Figure 6B illustrates an example optimization process. In step 612, the most recent optimization inputs are obtained from the optimization input database. Next, at step 613, the processing of two reactor simulation cases is initiated for each independent variable to determined the functional relationship of dependent variables to a change in a specified independent variable. The background of the invention, Figure 7 and related disclosure, etc. list examples of independent control variables and dependent variables. Again, the lists are not comprehensive, but the lists do provide one skilled in the art with sufficient information such that one skilled in the art would be able develop a more comprehensive list without undue experimentation. After all, optimization processes and reactor simulators are already well-known and thus so are comprehensive lists of control variables and dependent variables. Furthermore, claim 31 states optimizing <u>one or more</u> independent control variable values, and more than one control variable is listed.

During the Interview, the Examiner was under the impression that a reactor simulator was a mock up of a control room in which an operator could simulate operating a nuclear reactor. Applicants

explained that a reactor simulator was a computer program that, using control variable value inputs, generated predictions (dependent variable values) on the nuclear reactor's operating performance over a period of time. Applicants further explained that such simulators were well-known and that applicants had supplied the Examiner with a disclosure of such a simulator in the February 21, 2003 Information Disclosure Statement – see, for example, the Moore et al. article entitled "FORMOSA-B: A BOILING WATER REACTOR IN-CORE FUEL MANAGEMENT OPTIMIZATION PACKAGE," which discloses a full three-dimensional BWR (boiling water reactor) simulator.

Accordingly, for each incremental change in an independent control variable value two sets (one from each simulator) of dependent variable values is generated. Next, In step 614, a polynomial response surface is generated. While mentioned on page 16 with respect to Figure 6B, this step is described in detail on page 8 as well, which indicates that each independent variable value and associated dependent variable values are characterized as a polynomial. Numerous well-known methods exist for transforming independent and dependent data into polynomials, for example, curve fitting is one well-known mathematical technique. The coefficients of the polynomials are normalized and stored. The set of normalized coefficients for each independent variable value form what is called the response surface.

Using the response surface – equations characterizing the

relationship between independent and dependent variable values – each possible set of independent variable values can be considered and an optimized independent variable or variables determined. Namely, as discussed on page 8 of the disclosure, the generated variables using the polynomials are plugged into an objection function to determined which particular independent control variable values produce the greatest improvement. This is basically an exaggerated form of trial and error using an objection function as the engine for generating a comparative figure of merit for deciding on the optimal solution. Objective functions are well-known in the art and a matter of design choice that vary depending on the optimization and constraints the designer deems are important.

Applicants appreciate that this portion of the application deals with the art of COPs (Constraint Optimization Problems) and may use terms that, while well-known to those skilled in the art of nuclear reactor optimization, are not necessarily known to the Examiner. Again, this, applicants, contend is an indication that this application may be better classified in a different art unit. However, applicants have gone to the trouble of providing numerous references in the Information Disclosure Statement of February 21, 2003, that discuss COPs and provide teachings such that the Examiner should understand the disclosure of the subject application.

The Examiner Asserts the Preamble and Claim Body are Not Consistent

More specifically, the Examiner states that the preamble discloses a method of updating an independent control variable value, but that the body of the claim does not result in this updating. Again, this does not appear to be a proper Section 112, first paragraph rejection. The Examiner has not alleged that the specification does not enable either the preamble or claim body. Instead, it appears that the Examiner believes claim 31 to be unclear. As such, this rejection is more properly stated under Section 112, second paragraph. Accordingly, Applicants will address the rejection as such.

Applicants have amended claim 31 to read "A method of determining an updated independent control variable value," which applicants believe obviates the Examiner's rejection.

In view of the above, applicant's respectfully submit that no issues exist with the enablement of claim 31.

Claim 32 Issues

The Examiner asserts claim 32 is not enabled because the number, weighting, etc. of the state-point data to perform a proper optimization process is not described. Applicants disagree.

The specification discloses makes clear that even if one data in the state-point data differs from the current operating state, the optimization process is performed. As explained above, the state-point data does not necessarily form the entire basis for optimization, nor do the claims require such. And, as discussed above, optimization processes are well-known rendering the remainder of the Examiner's points moot, or in the alternative, the example optimization process disclosed in the subject application and discussed above with respect to claim 31 satisfies the enablement requirement for claim 32.

Claims 33 and 34

Applicants do not understand the Examiner's confusion with these claims. The specification and Figure 4 state with respect to step 402 that the currently received state-point data is compared to the state-point data used in the previous optimization. If a difference exists, then the optimization process is performed using the received state-point data as a replacement for the state-point data of the previous optimization. If the

Examiner is not sure of the meaning of state-point, then as discussed during this Interview, this is described on page 12, paragraph 34.

Claims 37 and 38-39 Issues

The Examiner states that the recitation of "displaying at least a portion of the state-point data" in claim 37 and "displaying at least a portion of results from the performing step" in claims 38 and 39 are not non-enabled. The Examiner states the application does not disclose which portion of the respective data to display or on what portion of a screen to display the data as the grounds for lack of enablement.

Applicants respectfully request that the Examiner reconsider the ground of his rejection. The specification teaches many supporting instances of the above recited claim language. For example, in one instance the specification teaches that the user may select portions of the optimization data base to view over a graphical user interface (GUI). Because the optimization data includes the state-point data, the user also controls what portion thereof is viewed. As another example, the specification teaches viewing the optimization output results.

The Applicants find it hard to believe that one skilled in the art would have to know what portion of display or what portion of the data to display in order to be enabled to display a portion of the state-point data or results from the performing step. Accordingly, the Applicants

respectfully request that the Examiner reconsider and withdraw this grounds of rejection.

Claims 40 and 41 Issues

Applicants believe the discussion above with respect to claim 31 and the example optimization process provided in the subject application have overcome the issues raised by the Examiner with respect to these two claims.

Accordingly, applicants respectfully request that the Examiner withdraw the Section 112, first paragraph rejection of claims 31-41.

Section 112, Second Paragraph Rejection

The Examiner rejects claims 31-41 under 35 U.S.C. 112, second paragraph for the reasons stated above in the Section 112, first paragraph rejection. For the reasons set forth above, applicants respectfully request that the Examiner withdraw this rejection.

Art Grounds of Rejection

Claims 31-39 stand rejected under 35 USC 102(b) as being anticipated by Takeuchi or Musick. Applicants respectfully traverse these art grounds of rejection.

In Takeuchi, current reactor data may be fed to an expert system 20 such as shown in Figure 1. The expert system 20 operates according to a process shown in Figure 2. Figure 2 is a flow chart showing that the expert system determines if the reactor is operating in an abnormal condition. If so, the expert system 20 determines if there is evidence of a reactor scram. Based on this determination, diagnostics are performed. What is clear from Takeuchi is that no optimization process is performed. As such Takeuchi does not disclose or suggest "performing an optimization process on one of a computer and computer network based on the received state-point data to generate one or more optimized independent control variable values" as recited in claim 31.

Musick is directed to a supervisory apparatus that attempts to ensure a reactor is operated within specified limits. Namely, Musick is directed to a protection system. No elements, process, etc. within Musick performs an optimization process. The core protection calculator referred to by the Examiner determines if the reactor exceeds some constraint requiring a control action, for example, needs to be scrammed (See col. 11-12). There is no optimization process being performed by the core protection calculator. As such Musick does not disclose or suggest "performing an optimization process on one of a computer and computer network based on the received state-point data to generate one or more optimized independent control variable values" as recited in claim 31.

Claims 32-39, dependent on claim 31, are patentable at least for the reasons stated above with respect to claim 31 as well as on their own merits.

Claims 40-41 stand rejected under 35 U.S.C. 102b as being anticipated by Takeuchi. Applicants respectfully traverse this art grounds of rejection.

As discussed above, Takeuchi does not anticipate or render claim 31 obvious to one skilled in the art. Therefore, claims 40-41, dependent on claim 31, are patentable at least for the reasons stated above with respect to claim 31 as well as on their own merits.

Claims 40 and 41 also stand rejected under 35 U.S.C. 103 as being unpatentable over Musick in view of Takeuchi. Applicants respectfully traverse this art grounds of rejection.

As discussed above, Takeuchi and Musick do not anticipate or render claim 31 obvious to one skilled in the art. Therefore, claims 40-41, dependent on claim 31, are patentable at least for the reasons stated above with respect to claim 31 as well as on their own merits.

Conclusion

Accordingly, in view of the above amendments and remarks, an early indication of the allowability of each of claims 31-41 in connection with the present application is earnestly solicited.
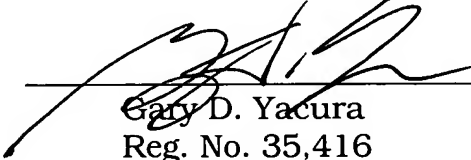
Should there be any outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact the undersigned below.

Pursuant to 37 C.F.R. 1.17 and 1.136(a), the Applicants respectfully petition for a three (3) month extension of time for filing a response in connection with the present application, and the required fee of $950.00 is attached.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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